# Pyrgeometer Data Manipulation

1) Given:

| | | |
|---|---|---|
| Thermopile Voltage | V | (mV) |
| Case Resistance | $R_C$ | (Ω) |
| Dome Resistance | $R_D$ | (Ω) |
| Gain Calibration Coefficient | $C_1$ | (V/(W/m$^2$)) |
| Dome Correction Coefficient | $C_2$ | = 4.0 |
| Stephan-Boltzman Constant | σ | = 5.67 x 10$^{-8}$ (W/(m$^2$K$^4$)) |

2) Calculate:

| | | |
|---|---|---|
| Case Temperature | $T_C$ | (K) |
| Dome Temperature | $T_D$ | (K) |

$$T_{C\,/\,D} = \frac{1x10^5}{273.09 + (26.3198 \times L) + (0.278237 \times L^2) + (0.0196739 \times L^3)}$$

where

$$L = \ln\left(\frac{R_{C\,/\,D}}{1000}\right)$$

and

$R_{C/D}$ is in (Ω).

3) Calculate:

Irradiance I (W/m$^2$)

$$I(W/m^2) = \frac{V}{1000 \times C_1} + s\,T_C^4 + C_2 s\,(T_C^4 - T_D^4)$$

where
- V is in (mV)
- TC/D is in (K)
- $C_1$ is in (V/(W/m$^2$))
- σ is in (W/(m$^2$K$^4$))